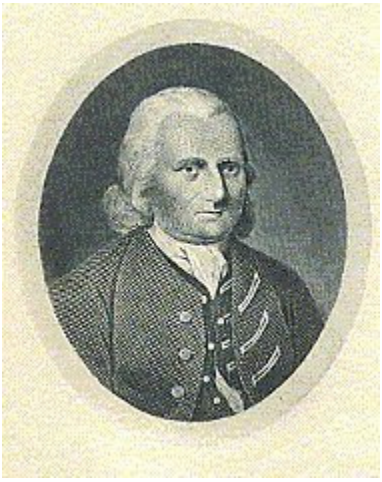
The Amazing Colden Family of Colonial America



Cadwallader Colden was the son of a clergyman of the Church of Scotland. He was sent to the College of Edinburgh where he studied the sciences under the famed Regent, Dr. William Law. Dr. Law taught his students the physics principles of Sir Isaac Newton. Colden graduated in 1705 and he then went to London to study mathematics, chemistry, anatomy and medicine before leaving for the colonies in 1710 as a medical doctor.

Cadwallader later married Alice Christy, who was university educated in a manner befitting her status as the daughter of a clergyman. After Cadwallader was named the Surveyor General of New York, the Coldens settled at their Coldengham estate in 1728. This presentation provides a brief overview of the scientific and literary accomplishments of the Colden family, including their remarkable children.

The sections of this presentation are:

- Colden Family Overview
- Cadwallader Colden's Contribution to the Field of Medicine
- History of the Five Nations and how that mattered in America
- Cadwallader Colden - Father of the Erie Canal and America's First Canal
- Cadwallader and his daughter Jane as Botanists
- Science and Electricity – The roles of Cadwallader and David Colden working with Benjamin Franklin
- The Life and Times of Cadwallader II – builder of the stone castle

Children of Cadwallader Sr. and Alice Cristy Colden **The Colden children identified in red will be discussed in this presentation.**
Alexander – born in 1716 and he died in 1774 at age 58. He was very successful in business in Newburgh. He operated the first ferry on the Hudson River for several years. In 1751, he was appointed joint Surveyor General of New York and he became acting Surveyor General when his father became acting governor in 1761. He also became postmaster of New York and vestryman at the prestigious Trinity Church in NYC and he died at age 58 in 1774.
Cadwallader II born in 1722 – Owner of the stone castle being stabilized by the Town of Montgomery.
Jane – born in 1724 – America's first lady botanist whose scientific accomplishments were known throughout America and Europe.
David – born Nov 27th, 1733 – Crippled at age 14, he was trained as a medical doctor by his father and he worked extensively with his father and Benjamin Franklin on matters of science and electricity.
Elizabeth born in 1721, **Alice** – born in 1726, **Sarah** – born in 1727, **John** – born in 1729 and **Catherine** born in 1731
Cadwallader David Colden – grandson of Cad Sr. and son of David – CDC will be introduced in the canal segment.

This essay will focus on the Cadwallader Colden, Sr. and his children identified in red above. This includes one grandson, also named Cadwallader, identified at the bottom of the table above. As this essay illustrates, the Colden family, including the children, contributed to early America in many ways. This essay is dedicated to each of these fine people.

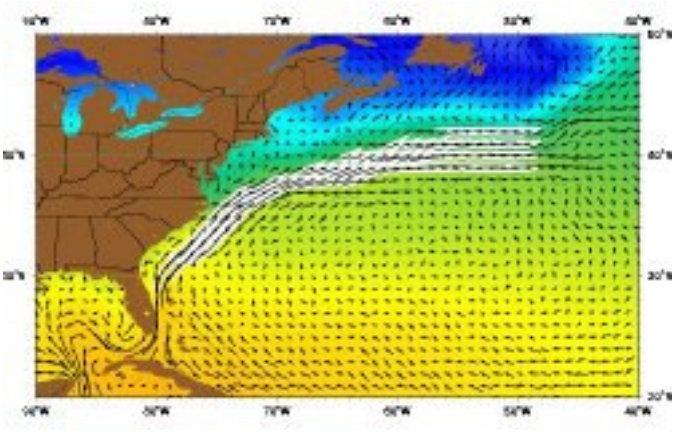
Benjamin Franklin Enters the Scene

In 1743, while sharing a carriage from New York to Connecticut, Cadwallader Colden and Benjamin Franklin Met for the first time. The discussion was lively and topics from advanced printing practices, politics, science and medicine were explored in some detail. Features of the natural world were of great interest to both men. Above all, Colden had explained that he was seeking support for a medical society in the colonies to exchange thoughts about the medical issues of the day.

He suggested to Franklin that a similar society should be formed to exchange valuable information about many different aspects of science and nature. Franklin had some prior experience in this regard having formed his Junto organization many years earlier. Colden believed that the new organization should be fully funded and scientists should be encouraged to participate. Both men knew that the science organization must have credibility in the eyes of the general public so that their opinions would be widely accepted. Within a year, the American Philosophy Society (APS) was formed as appears by a letter from Franklin to Cadwallader Colden, dated April 5th, 1744. Thomas Hopkinson was APS president, and Benjamin Franklin was the secretary. The other original members, as mentioned in that letter, were Thomas Bond (physician), John Bartram (botanist), Thomas Godfrey (inventor), Samuel Rhoads (statesman), William Parsons (geographer), Phineas Bond (physician), William Coleman (colonial judge), all from Philadelphia. A few members were likewise chosen from some of the neighbouring colonies and each brought prestige to the APS, each in their own way. This society gave Franklin a much-needed platform to elaborate on his scientific views with gentlemen who could provide valuable advice. Together with his association with Colden, who was highly respected in America and Europe, Franklin now had the communication vehicle he needed to advance his emerging theories on science and electricity.

The early correspondence between Franklin and Colden is replete with creative hypotheses and lively dialogue in

multiple branches of knowledge, from improved methods of printing, astronomy, botany, and many aspects of the natural world. As Franklin and Colden began to exchange these letters, Franklin provided his own theory of blood circulation, various scientific topics and his plan for a union of the American colonies. Franklin asked Colden if the diurnal motion of the earth might not cause ships sailing across the Atlantic to be slower on the westward than on the eastward voyage. Colden thought not. Franklin was unpretending. "*I ought to study the sciences I dabble."*

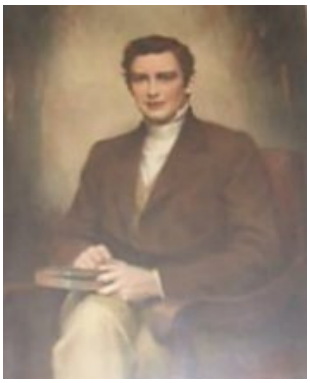


In several letters that followed, Colden explained that lakes and oceans have internal rivers of their own that direct and redirect currents in a manner that permits ships traveling eastward toward Europe to make the trip faster than those on the return trip. It would take over forty years before Colden's advice to Franklin would bear fruit. In 1786, Franklin was able to chart the currents that comprise the Gulf Stream which runs up the eastern coast of the United States, shown in brown at the left of the image, and then it turns eastward toward Europe, thus solving the puzzle about the travel time of ships that Colden and Franklin discussed four decades earlier. These two brilliant gentle men would also exchange theories about many topics like whether waterspouts, common in the southern Atlantic waters, actually causes ocean water to rise or whether the spout is water drawn from the forming clouds. It is this type of 'out of the box' thinking that renders solutions to common challenges in the natural world.

Cadwallader Colden's Medical Practice:

Cadwallader Colden did not practice medicine after 1718, except on family and friends, after his appointment at Surveyor General of New York. Colden did, however, participate in the medical debate of the time and, on occasion, he played a direct role in helping to control the diseases of the day. There were no medical societies in the early eighteenth century and very few medical treatises were written or printed. Benjamin Franklin, among his other talents, a major contributor to American medical literature.

During the years 1743 and 1744, Franklin's press reached the height of its activity in the number of titles produced annually. At this time, the New York doctor, Cadwallader Colden, wrote an essay on the Illiac Passion which his friend, Franklin, published. This was one the earliest medicinal books in America on the topic of inoculation where Colden argued successfully against the use of quicksilver and against the practice of blood purges when the patient shows signs of the disease. Colden is credited with the first attempt to establish systematic lectures on medical subjects in the Colonies. In 1743, Colden walked the streets of New York City treating people afflicted with various diseases. Colden published an essay. *An Account of the Climate and Disease of New York,* noting the correlation between filthy living conditions and high rates of disease in New York City. This was particularly prompted by an epidemic of yellow fever. Colden also wrote *The Fever which prevailed in the City of New York in 1741 and 1742*, wherein he identifies the dangers that come from water, soil and impure air and he emphasized the need for improved ventilation among the poor and an improvement of the water supply and, above all, the need for a public system of drainage. Colden's keen sense of observation permitted him to realize the correlation between higher prevalence of the disease and the more filthy conditions in those locations. Colden's essays and his prominent public position were critical for establishing the sanitation efforts of New York City, and a milestone in the development of the field of public health.



Probably the most interesting articles written by Colden was a letter written to Dr. Fothergill of London. In this letter, Colden described a manifestly contagious disease that he identified as the Throat Distemper which had prevailed in

New England in 1735 and later years. Another noteworthy letter to Dr. John Bard in London on July 5, 1758, was about Colden's son, David, pictured above left. Colden explained his son's frail physical condition, which deteriorated at the age of 14 by an unknown disease, today believed to be scoliosis. In 1758, David was to be inoculated against smallpox. This process introduced the disease in a small amount to the patient to help the body develop antibodies to ward off a real attack of the disease. Inoculation, however, sometimes causes the disease to actually emerge as was the case with David Colden. In the referenced letter, Cadwallader Colden revealed his keen sense of observation by detailing for Dr. Bard all of the observed conditions of his son's heartbeat, perspiration, breathing, skin condition and many more conditions, all observed over a period of days. Colden's clear, concise letter to Dr. Bard revealed his remarkable ability to focus his attention on things that are important to the task at hand.

In a long series of letter exchanges with several European and American scientists, including Benjamin Franklin, Dr. Colden offered his technical opinion on a number of medical conditions. In a very direct sense, he influenced the medical debate over a long period of time, regarding an understanding of the basic functions of the human body.

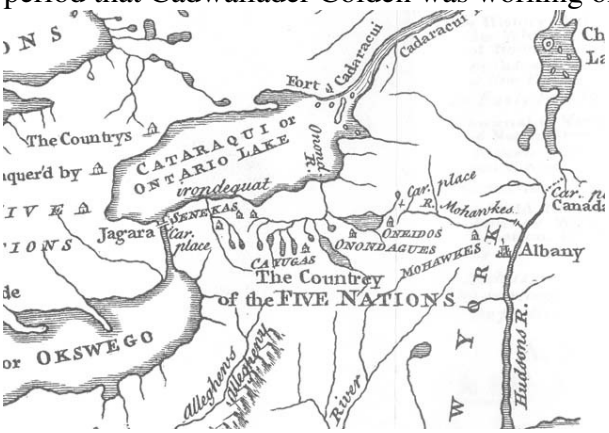
History of the Five Nations by Cadwallader Colden

Edit - A separate essay about this topic is available so this section will be brief. Go to the web site below for that essay.
http://home.roadrunner.com/~montghistory/

Cadwallader Colden's 'History of the Five Nations', America's first history book, was widely read in America and in Europe, even among royalty, where news of the colonies and Native Americans was very much cherished. Colden took great pains in this book to correct colonial practices relating to fair treatment of the Iroquois while urging serious negotiation practices. This book served to educate the colonial officials in this regard.

Colden's 'Five Nations' was written using the more colorful English verse that was so common in that time period. It was also common to use an 'f' or two 'f's to denote the use of the letter "s". This text will use the more colorful original prose when necessary while using actual quotes from the book. Colonial Americans used capital letters for most nouns and slightly different spelling, as you will see with exact quotes herein.

The original 'Five Nations' book by Colden was written in 1727 (Part 1). Part 2 was published in 1747. During the period that Cadwallader Colden was working on Part 2 of the book, he was in almost constant contact, by letter, with Benjamin Franklin, with whom Colden had maintained a long friendship and mutual admiration. The author has added some quotes from Franklin in this text that were acquired from letters written by Franklin to Colden during the 1740s as Native American issues were being discussed between these two gentlemen and scholars.



Franklin requested and received copies of Colden's, *History of the Five Nations.* On January 27, 1748. He mentioned to Colden in a letter that he had read the *History of the Five Nations* and thought "*that 'tis a well wrote, entertaining and instructive Piece*," which must have been "*exceedingly useful to all those Colonies*" who had anything to do with Indian affairs. Five years later, in a letter to Colden, Franklin noted that he had seen extracts of Colden's book "*in all the magazines*." Benjamin Franklin to Cadwallader Colden, October 25, 1753, *Ibid.,* V, p. 80.

The Five Nations consisted of the Mohawks, Oneydoes (Oneida), Onnondagas (Onondaga), Cayugas and Sennekas (Seneca). This was the Iroquois League or Confederacy. The Tuscarora nation was added to make the number six in later years. These Nations occupied much of northern New York. The map above was redrawn from the 1747, Part 2, version of the Cadwallader Colden book. This shows the area near the Finger Lakes, east of Lake Erie where the five

tribes or nations lived. To the north were the French in Canada. Near the Five Nations were Dutch in Schenectady, which was a small village then. The British were located to the east near Albany and occupied most of southern and eastern New York. Other Indian tribes inhabited the land to the west of Lake Erie while more tribes lived near the French in Canada. To the south, British colonies were established in Mary Land and Virginia and local Indians lived nearby, typically under friendly terms.

Together the Five Nations comprise the oldest living participatory democracy on earth. Their governance was truly based on the consent of the governed, and contains a great deal of life-promoting intelligence for those of us not familiar with this area of American history. The original United States representative democracy, fashioned by such central authors as Benjamin Franklin and Thomas Jefferson, drew much inspiration from this confederacy of nations as introduced by Cadwallader Colden. In our present day, we can benefit immensely, through understanding of a government truly dedicated to all life's liberty and happiness, as practiced by the Five Nations for over 800 hundred years, well into what we refer to as prehistory.

The Five Nations called themselves Rodinunchsiouni. The French called them Les Iroquois. Each of the Five Nations was an absolute republic by itself, governed in all public affairs of war and peace by the Sachems or Old Men. The chiefs were known as Captains. The great men, both Sachems and Captains, were poorer than others in the nation (common people). They give away their presents and plunder. If they should be suspected of selfishness, they would grow mean in the opinion of the people and then loose their authority. Each Sachem or Captain had to maintain strict adherence to poverty and personal suffering to be considered acceptable as representatives of the tribe or nation. The notion that the tribal elders and leaders would have to endure some form of poverty was contrary to prevailing thought, as it is even today. The British officials did not know what to make of this but they did, over time, learn that the Sachems and Captains spoke to them in a manner meant to benefit the people of their nations and not themselves. Sachems would routinely decline offers of special food and lodging during periods of negotiation so their judgment would not be clouded. Each nation comprised of three tribes or families. Each family had their own emblems or ensigns (bear, wolf. etc.). The Sachems of these families put their tribal mark or ensign on any document when they signed

> *The Iroquois' military leaders, like the civilian sachems, "obtain their authority . . . by the General Opinion of their Courage and Conduct, and lose it by a Failure in those Vertures,"* Colden wrote. He also observed that Iroquois leaders were generally regarded as servants of their people, unlike European kings, queens, and other members of a distinct hierarchy. It was customary, Colden observed, for Iroquois sachems to abstain from material things while serving their people, in so far as was possible:
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> *"Their Great Men, both Sachems [civil chiefs] and captains [war chiefs] are generally poorer than the common people, for they affect to give away and distribute all the Presents or Plunder they get in their Treaties or War, so as to leave nothing for themselves. If they should be once suspected of selfishness, they would grow mean in the opinion of their countrymen, and would consequently lose their authority."*
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> Cadwallader Colden, 1727

The original form of Roman government, Colden believed, was similar to the Iroquois' system, which he described in some detail. This federal union of the Iroquois Confederacy, Colden said, "*has continued so long that the Christians know nothing of the origin of it,"*

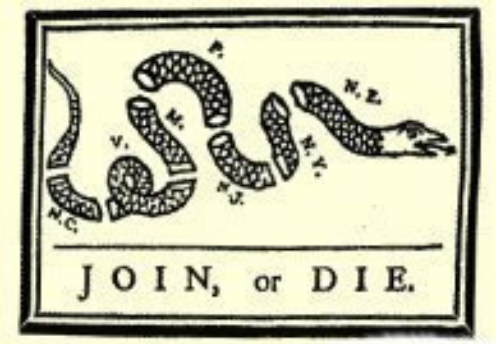
> *"Each nation is an absolute Republick by itself, govern'd in all Publick affairs of War and Peace by the Sachems of Old Men, whose Authority and Power is gained by and consists wholly in the opinions of the rest of the Nation in their Wisdom and Integrity. They never execute their Resolutions by Compulsion or Force Upon any of their People.*

Honour and Esteem are their principal Rewards, as Shame and being Despised are their Punishments." (Cadwallader Colden, 1727)

"*The Five Nations have such absolute Notions of Liberty that they allow no kind of Superiority of one over another, and banish all Servitude from their Territories."* Cadwallader Colden, 1727

The Iroquois confederation was governed by a constitution, the Great Law of Peace, which established the league's Great Council: 50 male royaneh (religious-political leaders), each representing one of the female-led clans of the alliance's nations. What was striking to the contemporary eye was that the 117 codicils (articles) of the Great Law were concerned as much with constraining the Great Council as with granting it authority. "*Their whole civil policy was averse to the concentration of power in the hands of any single individual,*" explained Lewis Henry Morgan, a pioneering ethnographer of the Iroquois.

In one of America's first editorial cartoons, Benjamin Franklin advocated colonial unity in 1754 with the slogan "Join, or Die" under a disjointed snake, each piece of which had the name of a colony. The drawing appeared in the *Pennsylvania Gazette,* May 9, 1754, just before the Albany Conference with the Iroquois and the English colonies. The snake (sometimes accompanied by the phrase "Don't Tread on Me.") became a popular symbol of colonial unity, much like the covenant chain image Franklin later would use in designs for early United States coins. It is significant that the New York Tammany Society retained the Rattlesnake as the clan totem for Pennsylvania throughout the 19th century



political cartoon by Benjamin Franklin

On June 11, 1776 while the question of independence was being debated, the visiting Iroquois chiefs were formally invited into the meeting hall of the Continental Congress. There a speech was delivered, in which they were addressed as "Brothers" and told of the delegates' wish that the "friendship" *between them would "continue as long as the sun shall shine*" and the "*waters run*." The speech also expressed the hope that the new Americans and the Iroquois act "*as one people, and have but one heart*." After this speech, an Onondaga chief requested permission to give John Hancock, the Congress President, an Indian name. The Congress graciously consented, and so the president was renamed "*Karanduawn, or the Great Tree."* With the Iroquois chiefs inside the halls of Congress on the eve of American Independence, the impact of Iroquois ideas on the founders is unmistakable. History is indebted to Charles Thomson, an adopted Delaware, whose knowledge of and respect for American Indians is reflected in the attention that he gave to this ceremony in the records of the Continental Congress.


Iroquois at the Continental Congress

So vivid were these examples of democratic self-government that some historians and activists have argued that the Great Law of Peace directly inspired the American Constitution. Taken literally, this assertion seems implausible. With its grant of authority to the federal government to supersede state law, its dependence on rule by the majority rather than consensus and its denial of suffrage to women, the Constitution as originally enacted was not at all like the

Great Law. But in a larger sense the claim is correct. The framers of the Constitution, like most colonists in what would become the United States, were pervaded by Indian images of liberty.

Cadwallader Colden was not opposed to democracy, he loved it. He enforced the Stamp Act but he hated it and he was vocal about that and other injustices that his countrymen had to endure under King George. Colden would have remained loyal to the British Crown to honor the oath of office that he freely gave. He thought that the Revolutionaries were rowdies, and to some extent, they were in the early years. The Boston Tea Party was not an orderly affair. While Colden would have remained loyal to the crown, he might have had a slightly different opinion of the Revolutionary effort if he could have read the Declaration of Independence. By the time that document was printed and shipped out to the colonies, it was August of 1776. By this time, Colden was on his death bed and he died one month later in September. I think that Colden would have recognized the Declaration as a product of his own work, the History of the Five Nations.

To get the complete 'Five Nations' essay, go to http://home.roadrunner.com/~montghistory/ and scroll down a bit

Cadwallader Colden – Father of the Erie Canal

In the late 1700s, various canal proposals were being considered with the goal of bringing economic prosperity to America. This map shows northern New York and the land of the Five Nations of the Iroquois. The map accompanied the 1747 edition of the original Colden 'History of the Five Nations' book and it shows where Cadwallader Colden suggested to New York Governor Burnett, that a canal should be constructed to connect the Hudson River with the Great Lakes to enable increased trade with Native Americans (for fur) and western settlers for agriculture products and other trade opportunities. Colden presented his vision for a canal to Colonial Governor Burnett on November 6, 1724 in a detailed memorandum.

Canals of New York

Colden, acting as the New York Surveyor General, was the first to see the advantages of the topography of the land and the advantages of using natural New York streams and rivers as a means of commerce, in comparison to the French route up the St Lawrence River, which represented awkward travel during the winter months. Colden said about the French route that "*The French Never attempt above one voyage in a year to Europe or to the West Indies, tho' it be really nearer Europe than any of the English colonies*". Colden's proposal was the first suggestion regarding the course of the interior route canal, almost exactly along which the Erie Canal was finally built over 100 years later.

In the latter part of the eighteenth century, several proposals for an east-west canal were considered. Benjamin Franklin lobbied for a canal in his home state of Pennsylvania. Civil engineer, Robert Fulton, urged President George Washington to consider a canal in upstate New York as Colden had first proposed. Colden's grandson, son of David, would soon return from England and become a successful lawyer in America. He also was a colonel in the militia during the War of 1812, New York State Senator, member of Congress, Mayor of New York City and President of the anti-slavery Manumission Society. The Colden grandson teamed with New York politicians close to DeWitt Clinton who, as a young lad, lived close to the home of Cadwallader Sr. and whose family had close ties to the Coldens. This Colden, Cadwallader David Colden, became close to author James Fenimore Cooper and General Lafayette in the process. He was also the biographer of Robert Fulton.

The political opposition included Martin Van Buren, of Federalist fame, and others who wanted to scuttle the canal effort known at the time as Clinton's Folly. But the efforts of Clinton and Colden were successful and, in 1817,

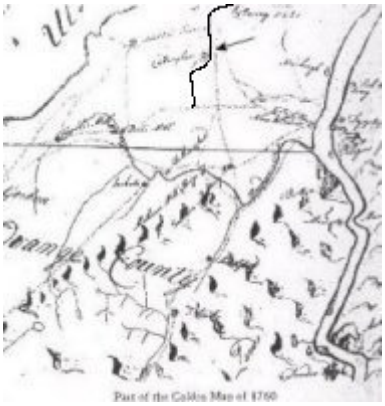
Governor Clinton said: "*The day will come in less than ten years when we will see Erie waters flowing into the Hudson*." He was quite correct because the canal was completed eight years later in 1825.

The huge 1825 Erie Canal celebration was attended by tens of thousands of folks from all over America and President John Quincy Adams presided together with Governor DeWitt Clinton. In attendance also were four former Presidents of the United States: Jefferson, Adams, Monroe and Madison. Also present was the last general of the Revolutionary War, Lafayette. All cheered as the Colden grandson's (Cadwallader David Colden) read the memoir that his grandfather prepared 101 years earlier.

Then a huge engraving was unveiled that contained the images of the ten people who the Erie Canal Commission considered the most significant contributors toward construction of the canal. DeWitt Clinton's image was placed at the bottom, presumably out of modesty. Grandson Cadwallader David Colden's image was located just to the above right of Clinton's. The image of Cadwallader Colden Sr. was at the very top of the engraving, even above the image of George Washington. This significant recognition of the senior Colden's 1724 memoir, and his pinpoint accuracy in selecting the canal site, together with his position at the very top of the Erie Canal plaque mean that the senior Cadwallader Colden truly deserves the title: "Father of the Erie Canal".

Grandson Cadwallader David Colden would pursue canal building for the remainder of his life, becoming very instrumental in the design and construction of the Morris Canal in New Jersey among many others. While in Coldengham, the young Colden grandson likely saw our nation's first canal, built by his grandfather in the Town of Montgomery and that was enough to inspire the work of a lifetime.

America's first canal was not the Erie, however. A smaller but much earlier canal was built by Cadwallader Colden in the Town of Montgomery, possibly in the 1730s although no hard evidence exists to identify the timeframe. This canal was constructed to the south of the original 1720s Colden home on Maple Lane and it likely carried stone for building material and peat for fuel from the lands to the south up to his home, and later the home of his son, Cadwallader II who built the 1767 stone castle. The first Colden home no longer exists but it was located where the Tin Brook turns from an easterly flow to a northerly flow just to the east of the Colden cemetery per a 1770 deed. See the darkened area with the arrow in the actual Cadwallader Colden map to the left. In the early days, all streams were more robust and they were much more capable of being used for transport than they are today. Even, so, it was necessary to provide some additional means of elevating the water to assist with boat travel. For Cadwallader Colden, the Tin Brook would be his water source and he would build dams to prevent water from draining into the nearby swamp.


Part of the Colden Map of 1760

He wanted to channel the water upstream in the Tin Brook so that the water flow would propel large barges, probably flat boats, built to carry the stone and peat. Colden's canal did not have to be operational twenty-four hours a day or

seven days a week. The canal was likely used several times a year, only when Colden needed to transport the material, likely stone in the spring for construction and peat in the fall for wintertime fuel. There are very few remnants of the canal still in existence. In 1968, Malcolm Booth, archaeologist and historian, realized the construction of Route 84 at the end of Maple Lane was about to obliterate the canal and he conducted an archaeology survey to document the remains before they would be buried. The construction of the canal was basically to the east of Maple Avenue (see the stream path in the photo to the left). Some of the canal remnants are today under the Rt 84 roadway.

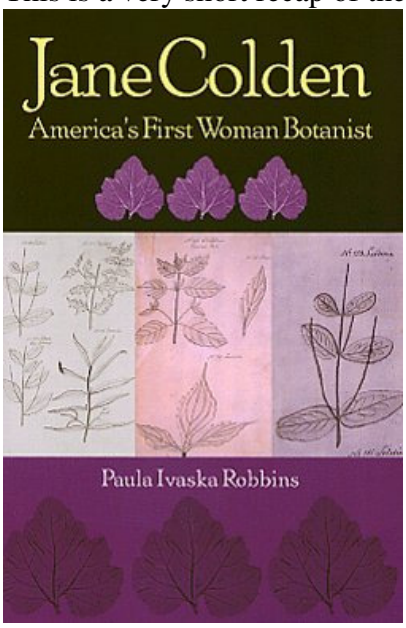
Most of the canal remains are on private property and very little opportunity exists to survey or preserve what might still exists from this once interesting feature. Note the second aerial photo, shown here, below left. This is an aerial view of where the original Colden home was built at the upper end of Maple Avenue. You can see the Colden Cemetery to the right side of the image, where the square stonewall of the cemetery is visible. Maple Avenue is at the left side and the Tin Brook runs through the properties. It is this location where a gristmill was likely built also.

In later years, the property was the home of Cadwallader Colden's grandchildren and it was used by the local militia during the Revolutionary War, when the soldiers referred to it as the Academy.

No trace of the original Colden home exists today. The stone castle on Rt 17K was built by Cadwallader Colden's son, or Cad as his family referred to him. To get the complete Colden canal essay, go to the following web site. http://home.roadrunner.com/~montghistory/

Jane Colden, America's First Lady Botanist

This is a very short recap of the professional achievements of Jane Colden, daughter of Cadwallader Colden. Her story is a tribute to American achievement and, in my opinion; it represents one of the most significant stories regarding the triumph of determination and the application of difficult work in the pursuit of one's own personal goals. There have been several scholarly printed works about Jane and I will mention just two here in the essay while others are noted in the bibliography. First, the scholarly article entitled *What Jane Knew* by noted author Sara Stidstone Gronim represents a fine and enduring testament to Jane as a true scientific achiever in the challenging word of eighteenth century colonial America. See the bibliography for the reference to Sara's fine work. The second work is the recently published book about Jane by author Paula Ivaska Robbins, an author of several other volumes including *The Travels of Peter Kalm,* a Swedish botanist who toured America in the 1750s.

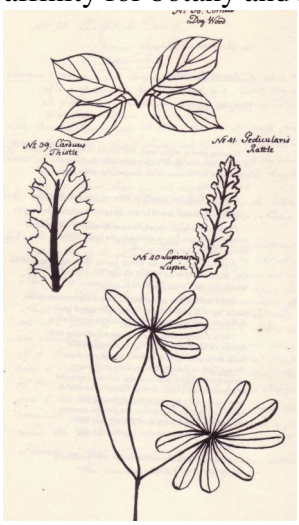


Jane was only three years old when she came to Coldengham with her family. Her father wanted to make sure that the healthier country life would be available to his family, with cleaner air and sanitation, which was very poor in the cities.

Coldengham, as Jane's father named the family estate, was the product of three years work to prepare for the arrival of the entire Colden family. Growing up in Coldengham had its challenges and rewards. There were no schools and everything that the Colden kids learned came from their mother and father, primarily their mother because Cadwallader Sr. had to travel a lot on Province business so the family duties fell to Alice. Since she was also university educated, the Colden children would receive the best education possible under the circumstances. Each child also had many farm related chores to contend with on a daily basis.

Jane's father, Cadwallader Sr., learned of the new classification system for plants that was developed by the world renowned Carl Linnaeus of Sweden. He studied the Linnaean document and, over a period of years, Cadwallader would work to document the flora of New York. He presented this work to American naturalists in a document named Plantae Coldenghamiae, which the great Linnaeus would publish in Europe in 1749. Linnaeus was so impressed with Cadwallader Colden's work that he named a flower after him, Coldenia.

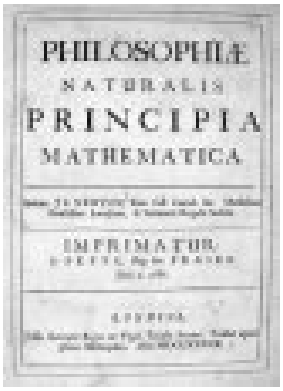
Jane's introduction to botany came as she helped her father gather plants and clean and dry them for illustration. In doing this, Jane had to be coaxed into the process. Jane also interviewed many local people to learn about their possible medicinal uses for the plants. Cadwallader knew that Jane had an affinity for botany and he translated the Linnaean classification for her use. Once she grasped the complex system, she began to pursue botany in earnest. In short order, Jane's botanical skill increased to the point where she was superior, in this regard, to her father. Jane was able to make leaf impressions on paper and record very precise details about when and how the plants bloomed and what locals thought were the health benefits from each. The image to the left is an actual dogwood impression made by Jane in the 1750s. This progress pleased the senior Colden greatly and he began to mention Jane's skill in his correspondence with various naturalists both in the colonies and in Europe. As the French and Indian War heated up, Cadwallader knew that he should move his family to New York City for their safety. While her brother, Cad, remained in Coldengham to serve in the militia, Jane traveled with her parents to the city where she would complete the work on her botanical manuscript. In 1759, she would meet and marry Dr. Dr. Alexander Garden. The marriage was a short but happy one. In 1760, both Jane and her baby died of an unknown cause. The success that Jane achieved in the science of botany should serve as a role model for people of all ages to pursue their own personal goals with the same determination and hard work that Jane exhibited. After the war, Jane's manuscript was carried to Europe, likely by a British or Hessian soldier and it resides today at the Botany Library, Natural History Museum in London.



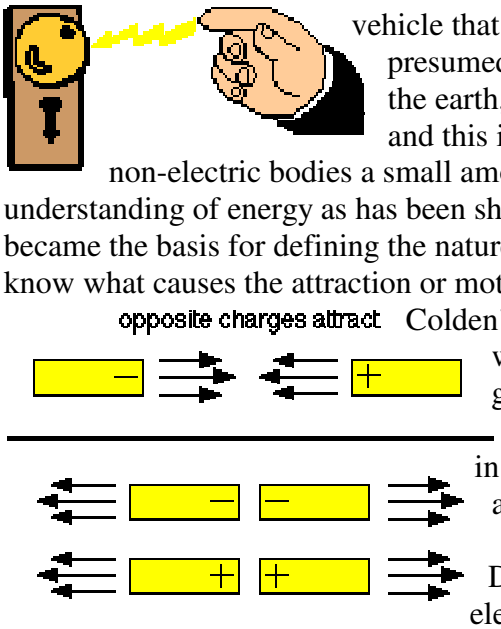
The Scientific Coldens – Cadwallader and his son, David

In the early eighteenth century, the primary source of information regarding matter, gravity, mathematics and other scientific matters came from one of the most influential individuals in human history, Sir Isaac Newtown (1643-1727), portrait shown to the left. Scientists, to this day, credit Newton with incredible achievements well beyond those of other scientists. Newton's theories were articulated in his masterpiece work entitled *Principia Mathematica* or simply *Principia,* as it would become known. Newton explained the effects of gravity, although not the cause, in incredible detail and he defined matter in purely mechanical terms. Matter, Newton said, was passive and that all matter was at rest until acted upon by other matter. Newton believed that matter was sent into motion by God and that all matter that is in motion derived its energy, ultimately, from God. Newton argued that the same gravitational force that causes objects to fall to earth is the same force that causes celestial bodies to spin on their axis and rotate around the sun. His mathematics

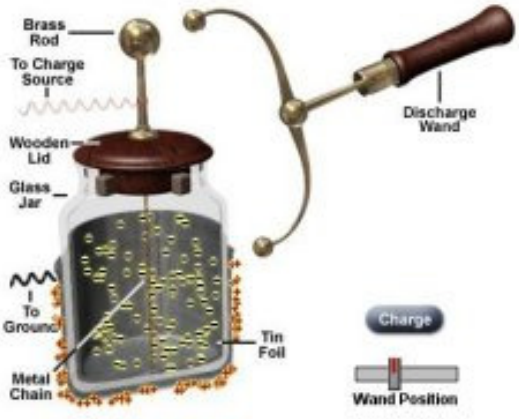
contributions are still valid today. His work addressed so many topics in science that he became the most prominent scientists of his time and ours. Not all scientists of the time totally accepted Newton's work. Gottfried Liebniz (1646-1716) was a German mathematician and scientist who challenged some of Newton's physics theories and he is often best known for optimism because he rejected Newton's observation that God did not create Earth in the best possible manner so, as Newton believed, we are left to dwell in an unsatisfactory environment. Liebniz shares the invention of calculus with Newton and his development of the math binary system, laughed at in his time, is the architectural basis for nearly all modern computers. Both of these men were scientific powerhouses.


PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA
IMPRIMATUR

It was into this powerful scientific debate that Cadwallader Colden dared to tread. He developed a series of physics opinions that were different from Newton's and he also claimed to have identified the cause of gravity, which he explained using very sophisticated mathematical equations. In 1746, he released his treatise entitled the '*Explication of the First Causes of Action in Matter and the Causes of Gravitation*'. Intended initially for a select few scientists in America, including Franklin and James Logan, Mayor of Philadelphia and a similar group in Europe, Colden's work was pirated, printed in several languages and sold throughout Germany, England and France. In America, Benjamin Franklin offered to publish Colden's work at his own expense. Colden's view of matter departed from Newton's mechanistic paradigm in that he contended that there were different types of matter like 'resisting matter', 'moving matter' and 'reacting matter'. Colden's theory that matter at rest was exerting an action in all directions to remain at rest. He viewed light as the vehicle that causes motion and he attributed gravity to the force provided by light. He presumed that the sun's light is the cause of the rotation of our celestial bodies, including the earth, around the sun. Colden observed that solid bodies must contain and emit light and this is true with electricity where electric bodies emit a great amount of light and non-electric bodies a small amount of light. Colden's light theory pointed directly to the Twentieth Century understanding of energy as has been shown by Albert Einstein. In reacting matter, he defined a form of elasticity that became the basis for defining the nature of electricity as an elastic fluid. Colden contended that we do not have to know what causes the attraction or motion of matter in the form of gravity to know the effects of gravity. Upon reading Colden's theories, Benjamin Franklin, is his classical simplistic form, explained that if we try to suspend a dinner plate in mid-air, we see that the plate falls to the ground and is broken. He said that we do not need to know why that happens in order to know how to protect our dinner plates. This reasoning offered promise in trying to understand why the 'elastic fluid' moves in conductors or through air and that this fluid is really a form of matter, acting understandably.



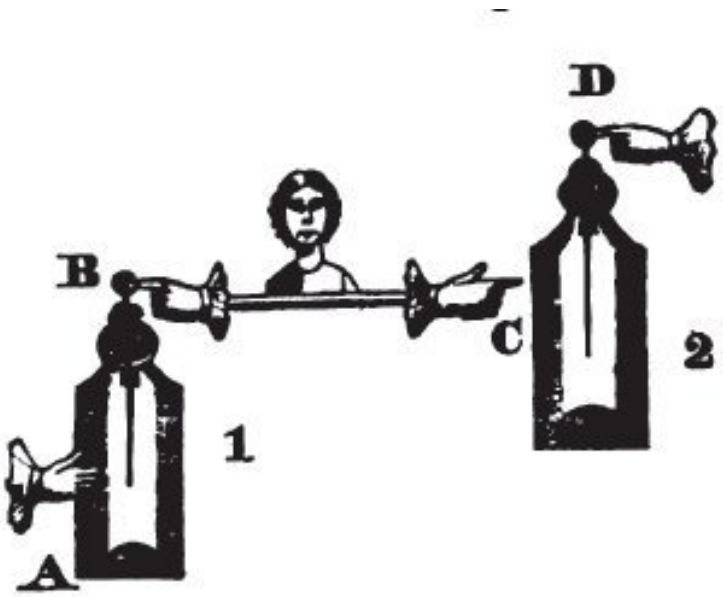
During the 1740s and early 1750s, an International debate ensued regarding electric charges and the nature of electric polarity (positive and negative charges). Benjamin Franklin and Cadwallader Colden noticed that some charged particles repel each other while other charged matter resulted in being attracted to other matter. This type of debate involved numerous experiments devised by several different people in America and in Europe with sometimes slightly different setup criteria and differing results. One major contention was the notion of electrical polarity, understood today, but under vigorous discussion in the eighteenth century. We know that like electrical charges repel and unlike charges attract. To acquire a fundamental understanding of electricity, the early scientists needed to fully understand such things as insulators and conductors and also objects that were not totally one or the other. It was common for scientists to share their theories and the results of their experiments with one another, even across the Atlantic. Among Europeans, it was naturally assumed that all knowledge traveled from east to west, namely from Europe to the colonies in America. Europeans believed that if any useful scientific discovery was made in America, it would have been previously made in Europe and that America was somewhat inferior to the 'enlightened' European world. As Colden and Franklin began to challenge the sacred theories of Newton and their own thoughts on the emerging field of electricity, the British and French Royal Societies began, in earnest, to discredit these Americans. Counter arguments were directed at Colden for his anti-Newton notions while several European scientists were dispatched to discredit Franklin's electrical work.



One interesting French scientist would lead the anti-Franklinists, as they were known, to battle Franklin's work while conducting experiments to illustrate how inferior they thought his work to be. Several German scientists backed Franklin as did one notable American, David Colden, son of Cadwallader Sr.. David Colden received his considerable education from his parents, primarily from his father in later years. He was trained as a chemist, mathematician, medical doctor and physicist without attending even one day at a school or university. His challenges included having to work from Coldengham, without access to fellow scholars and libraries.

David, a Franklinist, maintained a constant communication with Benjamin Franklin and he often used his father's steady exchange with Franklin to make a point or propose an experiment. For several years, David Colden duplicated and documented Franklin's electrical experiments while conducting his own numerous experiments at Coldengham. Preferring to remain out of the limelight, he shared these primarily with Franklin alone.

The device shown above is a Leyden Jar, named for the Netherlands university of its invention. This device was basically the first battery (capacitor) that could hold an electrical charge and it would become the source of numerous electrical theories and experiments during the 1740s and 1750s. This unique jar could be electrically charged through applying static electricity at the right point on the jar and the electrical charge would remain. The jar offered great promise that it would provide for a fundamental understanding of electricity principles. The jar did not disappoint. One of Franklin's French critics was Abbe Jean Nollet who, at an early age, was the leader of a religious abbey, hence the title, a member of the French Royal Society and one of the most renown scientists of his time. Nollet and Franklin exchanged several extensive letters explaining the merits of their experiments and theories. Nollet had a fundamental difference of opinion with Franklin on many topics, including the nature of electrical polarity. Franklin often replied to Nollet with papers that would be read at the Royal Society and, in turn, Nollet would send Franklin copies of his own works. Franklin would often share these communications with Cadwallader Colden, seeking his opinion on how to respond. In 1752, Franklin was disturbed that his time was being seriously challenged with these exchanges with Nollet that he decided not to formally respond to one set of attacks. Realizing this, David Colden took up the challenge and, in one very detailed response to the famed Abbe Nollet; David Colden provided rock solid proof of the validity to Franklin's polarity theory in the form of a detailed explanation coupled with an ingenious experiment.



The image to the left is David Colden's 1752 drawing where he describes how he, with two assistants, was able to discharge two Leyden Jars while being insulated (standing on a cake of wax). David and his assistants touched the jars at the specified points at the same time and the electrical charges flowed through his body to earth (discharge) through his assistants. This experiment was easily repeated in Paris and Franklin's theory of polarity was firmly upheld since the experiment proved that the outside of the jars were electrically positive and the inside electrically negative.

This was one of the few times that David Colden's work was read at the Royal Society and it made a lasting impression as you will see in the following pages.

Colden did not actually go to Paris. He simply mailed his electrical package to the French Royal Society using the return address of Coldengham (in New York). I am sure that many of the learned French scientists were wondering where that location was. Upon learning of David Colden's success in the Paris presentation, Benjamin Franklin wrote to Cadwallader Colden to inform of his pleasure with David's electrical response to the famed Abbe Nollet. Here is the excerpt from that letter.

TO CADWALLADER COLDEN.

Concerning Papers on Electricity. — Abbé Nollet. — Dalibard.

Philadelphia, 1 January, 1753.

DEAR SIR,

I have your favor of the third past, with your son's remarks on the Abbé Nollet's *Letters.** I think the experiments and observations are judiciously made, and so well expressed, that, with your and his leave, I would transmit them to Mr. Collinson for publication. I have repeated all the Abbé's experiments *in vacuo*, and find them answer exactly as they should do on my principles, and in the material part quite contrary to what he has related of them; so that he has laid himself extremely open, by attempting to impose false accounts of experiments on the world, to support his doctrine.

It is certain that David Colden's name was, from this time forward, known to the most serious scientists in America and Europe. Having gotten the best of the famed French scientist, David Colden deserved the kind words from Franklin and it is interesting to note that Franklin was going to send David Colden's experiment to Peter Collinson in London for publication, presumably at his own expense. Several years later, another letter from Benjamin Franklin to Cadwallader Colden would prove forever the significant contribution to the field of electricity made by David Colden. In this 1760 letter, Franklin begins by congratulating Cadwallader on assuming the position of acting governor. The interesting part comes in the second paragraph where Franklin notes that two packages of electrical experiments arrived from Abbe Nollet. The packages were for Franklin himself and for Cadwallader's son, David. To have his son included on a very short list of the Abbe's experiments must have made Cadwallader very proud. In that same paragraph, Franklin, not known for showering praise on others, notes David's value by saying the following:

From Benjamin Franklin

LONDON, Dec. 3, 1760

Dear Sir,

I take this first Opportunity of congratulating you most sincerely on your Accession to the Government of your Province, which I am the more pleas'd with, as I learn that the Ministry are well Satisfy'd the Administration has fallen into so good Hands, and therefore that you are not like to be soon superseded by the Appointment of a new Governor.

The Abbé Nollet has lately published another Volume of Letters on Electricity, in which he undertakes to support his Principles against the Attacks they have met with from all Quarters. He has sent me a Copy, and another for your Son Mr David Colden. I take the Freedom of forwarding it under your Cover, with my best Respects to that very ingenious young Gentleman, whose valuable Work on the same Subject I am Sorry has not yet been made publick.

With the greatest Esteem and Regard I have the Honour to be

Dear Sir,

Your most obedient and most humble Servant

B. FRANKLIN

Honble CADR. COLDEN Esqr

I take the Freedom of forwarding it under your Cover, with my best Respects to that very ingenious young Gentleman, whose valuable Work on the same Subject I am Sorry has not yet been made publick.

With these words, Benjamin Franklin has extended well-deserved praise on David Colden for his own great contribution to the science of electricity. It is clear that history granted Franklin the lion's share of the credit for the electrical scientific advancements and most deservedly so.

History should also add a footnote that also credits others whose own significant contributions made a true difference in the scientific dialogue. This would include both Cadwallader Colden and his ingenious son (as Franklin notes), David.

It is through the preservation of the Colden and Franklin letterbooks and the recent digitizing of Franklin related documents, previously unpublished, that we can now offer a full and complete critique of the electric Coldens and their contribution to science.

Benjamin Franklin extended comments to Cadwallader Colden in a slightly different fashion, by comparing the two of them. As Franklin was about to explain to the world that the great lightning force that they saw in the sky was not the wrath of God, as people believed for thousands of years. It was, instead, the same energy (elastic fluid as Colden called it) that we saw in the jar. Franklin knew that this notion would be greeted with scorn and ridicule in England and France.

In 1752, Franklin wrote to Colden: "*Tis well we are not, as poor as Galileo was, subject to the Inquisition for philosophical heresy*," reflecting on the battles they jointly shared over the years. "*My whispers against the orthodox doctrine in private letters, would be dangerous; your writing and printing would be highly criminal. As it is, you must expect some Censure, but one heretic will surely excuse another".*

The above statement by Franklin recognizes that both men, Cadwallader and Benjamin were on the same intellectually risky path for some time.

The fact is that this trio, Franklin and the Coldens, were more closely joined in their scientific endeavors than previously thought. It is to the credit of all three men that America lead the way toward a fundamental understanding of electricity and the natural world in a manner that the Europeans would eventually recognize and support. David Colden remained loyal to the British throne and he remained on his father's Long

Island estate during the war where he became the Superintendent of Police. He inherited his father's property but that was confiscated after the war and he returned to England in 1784 with his son, of Erie Canal fame, to seek compensation for the loss of his property in America. He was partially successful and David died one year later in 1785.

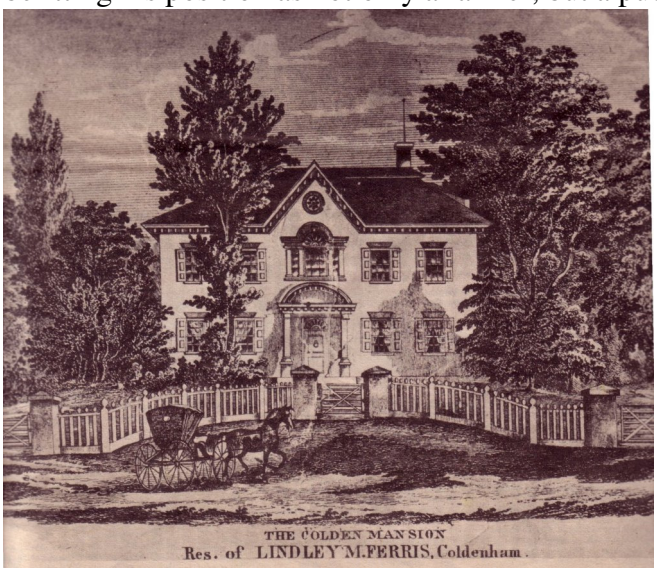
Note: A detailed and very technical essay is being prepared by the author of this document to more thoroughly identify the roles of Cadwallader and David Colden in the scientific advancement of the eighteenth century.

Cadwallader II or Cad

This is the story of our third Cadwallader, who built the stone castle in 1767. We previously discussed Cadwallader Sr., scientist, politician and author. Then we mentioned his grandson, also a politician who made his grandfather's dream, the Erie Canal, come to reality. His name was Cadwallader David Colden. Now we will discuss the son of Cadwallader Sr., Cad as his family called him.

Cad was not a successful businessman like his brother, Alexander. Nor was he likely to dabble in the sciences like his father or his sister, Jane, or his brother, David. Cad wanted to be a farmer and his father granted him a 500-acre tract of land in 1745 as he was preparing to become married to Elizabeth Ellison, the daughter of a distinguished country gentleman. Elizabeth's family home was owned by her father, Thomas Ellison, who graciously offered it for use by General Washington's generals during the Revolutionary War. When he gave the residence over to the Continental Army, he moved to the home of his daughter Elizabeth and Cad in Coldengham, by this time the stone castle. Within a year, Thomas Ellison, Elizabeth's father, passed away and the home transferred to Elizabeth's brother, John.

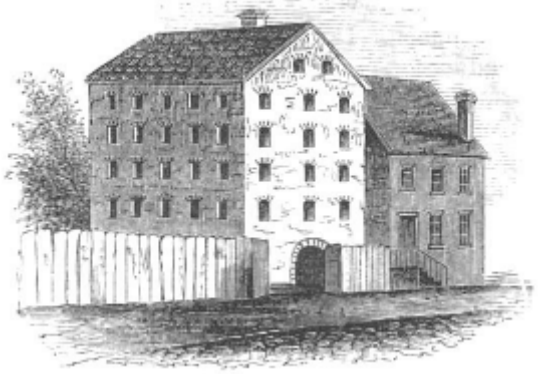
The home that Elizabeth shared with her husband, Cad, beginning in 1767 (shown below, left), was impressive befitting his position as not only a farmer, but a public servant as well. Cad had become the first Supervisor of the Town of Montgomery, known then as the Precinct of Hanover. Cad also served as a judge in the Ulster Court of Common Pleas. The Town of Montgomery (then the Precinct of Hanover) was part of Ulster County at the time. He was also a surveyor and deputy Surveyor General of New York while his father served in the principal position.

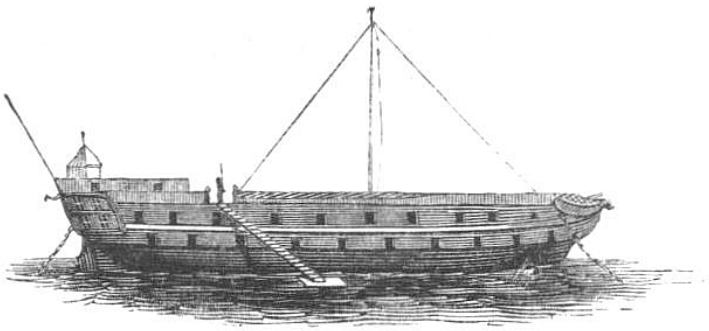


Cad also served for an impressive twenty years in the Ulster Militia, rising to the rank of major and, ultimately, colonel later in his service. Cad's service in the militia would test his sensibilities severely. He did not like to see the devastation that the French and Indian War caused in his own Hudson Valley. Cad initially commanded militia units that were stationed in Pine Bush and they would ride to the sound of gunfire or the sight of smoke, often too late to be of any value. The Indian attacks were severe in the early part of the war and Cad traveled to New York City in 1757 to encourage the British authorities to build a series of blockhouses along the Shawangunk Ridge, where he could station several soldiers who would act as a quick strike force in the event of Indian attack. This strategy was implemented. The blockhouses were built and staffed with Cad's soldiers in late 1757 and the Indian attacks almost immediately ceased. Cad's militia duty would continue up until the Revolutionary War began in earnest in 1775. For his service to the community in several capacities, his neighbors loved him. Cad was also a vestryman in the Anglican Church at St.

Andrews and this would draw the ire of one local clergyman, the Reverend Robert Annan, who led a faction of Presbyterians that opposed religious freedom for congregations they despised. Rev. Annan's Seceder Presbyterians differed from the Goodwill Presbyterians on this important issue, religious freedom. Cad had wanted to sit out the war on his farm and his neighbors knew that and appreciated his position. They also knew that Cad, acting in a neutral position, would not be a threat to the revolution. Then came the Rosa-Migdah affair as it was known. Several British loyalists and soldiers were traveling from Kingston southward toward safety in New York City when they were captured in southern Orange County. One of these loyalists said that their advance party stopped at the home of Cadwallader Colden (our Cad) for directions regarding how to avoid the colonial militia pickets and that they received help in that regard. This had not been verified but it inflamed folks like the Reverend Annan who used his sermons to demand the arrest of Cadwallader Colden II (our Cad). The arrest of Cad would prove to be a difficult task. At this time, the militias were organized on the precinct (town) level and Cad had commanded his own militia for over twenty years. There was no one to arrest Cad so the Reverend Annan incited his New Windsor Militia to conduct this difficult task. Upon hearing of his arrest, George Clinton (soon to become NY governor) said that the charges against Colden were weak and formed by hearsay but that he was safer in custody than free because of the malice shown by his enemies, most notably the Reverend Annan.

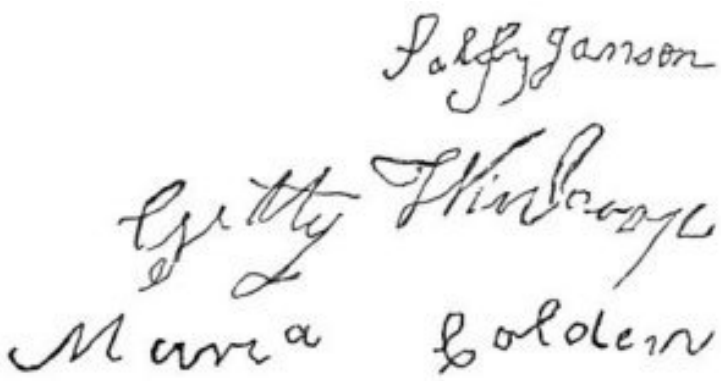
Cad was separated from his family on many occasions to answer to one of the many safety committees formed to assess the danger that potentially loyalist folks represented. Upon his arrest, he was summoned to various locations (Fishkill, Poughkeepsie, Kingston) to answer questions from the local committee on safety. On many occasions, the committee knew that Cad represented no threat and they instructed him to go home until, and if, they wanted to talk with him again. These 'paroles' infuriated the followers of the Reverend Annan, who argued for his re-arrest. Finally, to resolve the matter and rid themselves of a difficult situation, Cad was banished to New York City where he sought employment from the British to support his family. Elizabeth remained in Coldengham to run the farm and she gathered her children and nieces and nephews around her in the relative safety of the Hudson Valley. Employment positions were difficult to obtain and after numerous requests, Cad was named to fill the humanitarian position of Commissary of Prisoners for the British. In this position, Cad was responsible for traveling across military lines to visit the many prisoners who were in captivity by the Continental Army or the respective states, which would often relieve the army of these burdens. Conditions were very poor for prisoners on both sides of the conflict and the role that Cad played was viewed as highly respectable by both British and Continental soldiers. The more notorious prisons used by the British included the sugar houses (warehouses) and the many prison ships, like the New Jersey, shown to the left, that were anchored off the coast of Brooklyn. Cad would often act to carry mail and inform regarding the many Continental Army prisoners held by the British, which set quite well with his neighbors back home. Cad's humanitarian role was common knowledge back in Coldengham since his wife, Elizabeth, was so highly





respected that she was allowed to freely travel to New York to see her husband and ferry one or more of the family's children to or from the country.

The remainder of the Colden family remained at the family estate in Spring Hill, Long Island. Cad's brother David accepted the position of superintendent of police on Long Island and he was considered a combatant, not to be allowed back into New York after the war ended. On one occasion in 1780, toward the end of the war, Mrs. Knox, wife of the famous artillery general, hosted a ball at the Ellison house that they were using at that time. In 1780 this was the home of Elizabeth Colden's brother, John who graciously allowed the army to use it. The local tradition in the Ellison family is that General George Washington opened the ball by promenading from room to room with young 10-year-old Maria Colden on his arm. Another version of the story was that General Washington simply entered the ball with Maria on his arm. Maria was there with two of her friends about the same age. A French officer was so struck by the event that he used his diamond ring to inscribe the names of the three girls in a windowpane. The girls' names were Sally Jensen, Kitty Wynkoop and Maria Colden. Maria was the daughter of Cad's brother David, of electricity fame. It is highly likely that Cad's wife, Elizabeth, was there too since Maria, and the other girls, would have been in her care and the house was the home of her brother, John. It is interesting that, while her father, David, was on Long Island in the role of police super for the British, young Maria was in New Windsor dancing with the commander-in-chief of the Continental Army. Interesting also is that Elizabeth's attendance probably happened while her husband was banished to New York City.



Toward the end of the conflict, Cad was busy with arrangements to exchange prisoners of both sides. His allowance offered him the opportunity to assist the many prisoners who could not walk due to their injuries. He rented wagons for transport and he acted to relieve the severe experiences that these many soldiers would endure upon their release. After the war, Cad was one of the few Loyalists who were readily permitted entry to the Hudson Valley. He was generally accepted in his neighborhood and he joined St. Andrews Church on the Wallkill (Walden). He donated an acre of land so the parishioners could build a parsonage and he retired a sizable debt that the parish owed him. When Frederick Van Horne came to minister at the church, Colden's cemented his place within the congregation through the marriage of his granddaughter, Elizabeth Antill, to the Reverend Van Horne.

In the 1790s' Cad gathered what was left of the Colden family around him. There were many sad stories like his own sister, Elizabeth, who had married into the wealthy DeLancey family of Westchester. Her husband was killed during the war and her three sons, who fought for the British, all fled to England after the war. Cad's sister would spend the remainder of her days in sorrow at Coldengham. Cad had two sons who fought for the revolutionary cause in the Ulster County Land Bounty Militia, so named because the soldiers received tracts of land as payment. Another son, Thomas, fled to Nova Scotia after the war since he was a Loyalist who fought in the British Army. A few years later, Thomas quietly returned home with his wife to take up farming on his North Drury Lane home. No one cared or made a fuss over this. The family of Cad's wife, Elizabeth, was also fractured over the war. Her brother, John, was a revolutionary while her other brother, Thomas, was a Loyalist. Cad made sure that each of the children had enough land to farm and an allowance to get started with. This diminished his own wealth but he knew that this was his duty. Even young Maria, who danced with George Washington, was there, now in her twenties and married. Above all, Cad was a true family man. In 1795, Cad said to his wife: "*We have now lived together above fifty years, and I believe, no fifty years were spent happier by any other pair.*" Two years later, Cad would pass away thus bringing the story of the Colden family in eighteenth century America to an end.

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See separate document ColdenEssayBiblio021710.pdf for the extensive bibliography